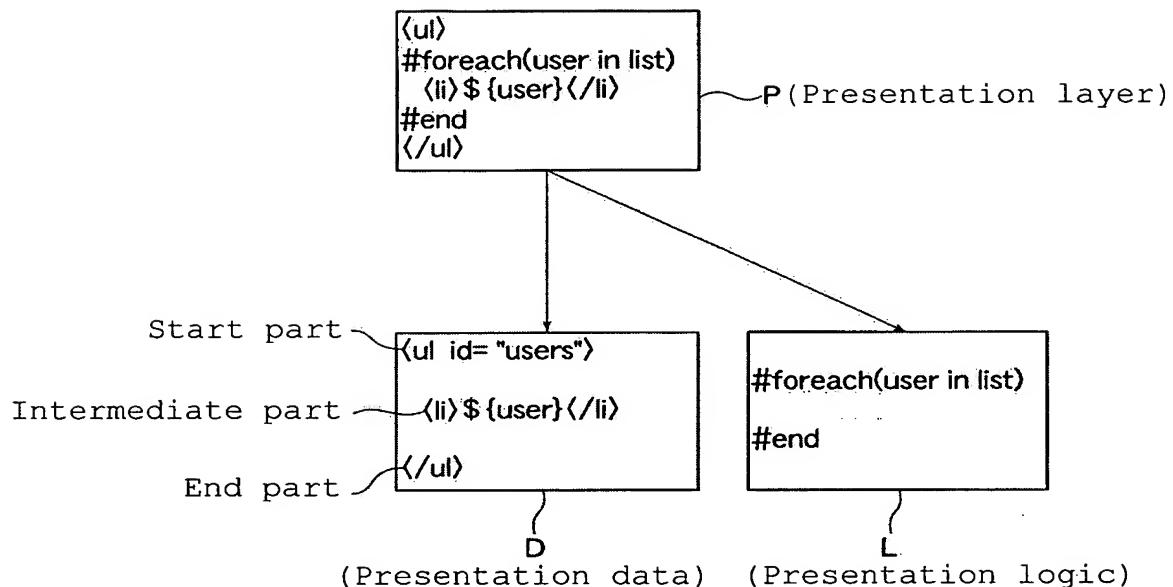
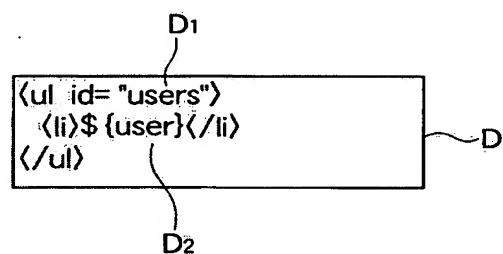


[FIG. 1]



[FIG. 2]



[FIG. 3]

```
#defmacro(head_users)
  <ul>
#end

#defmacro(body_users)
  <li> ${user} </li>
#end

#defmacro(foot_users)
  </ul>
#end

#defmacro(elem_users)
  #expand(head_users)
  #expand(body_users)
  #expand(foot_users)
#end

#expand(elem_users)
```

The diagram illustrates the expansion of a macro. It shows five stages of expansion, labeled M1 through M5, connected by curly braces and arrows. Stage M1 shows the initial macro definition. Stage M2 shows the expansion of the body macro. Stage M3 shows the expansion of the footer macro. Stage M4 shows the expansion of the element macro, which includes the expansion of the head, body, and footer macros. Stage M5 shows the final expanded form of the element macro.

[FIG. 4]

```
#defmacro(elem_users)
#expand(head_users)
#foreach(user in userlist)
    #expand(body_users)
#end
#expand(foot_users)
#end
```

[FIG. 5]

```
#expand(elem_users)
```

X → Expand macro

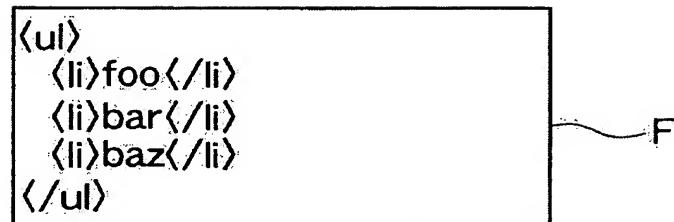
```
#expand(head_users)
#foreach(user in userlist)
    #expand(body_users)
#end
#expand(foot_users)
```

Y → Expand macro

```
<ul>
#foreach(user in userlist)
    <li> ${user} </li>
#end
</ul>
```

[FIG. 6]

```
<ul>
  <li>foo</li>
  <li>bar</li>
  <li>baz</li>
</ul>
```



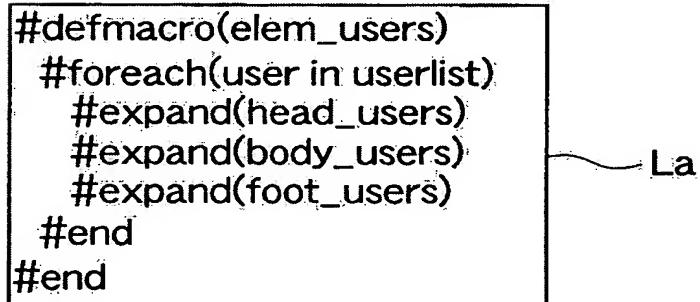
A rectangular box contains the following HTML code:

 foo
 bar
 baz

A wavy arrow originates from the right side of the box and points to the right, labeled with the letter 'F'.

[FIG. 7]

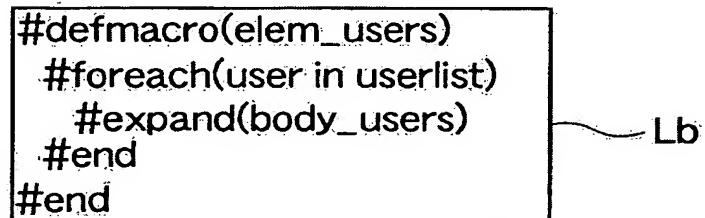
```
#defmacro(elem_users)
  #foreach(user in userlist)
    #expand(head_users)
    #expand(body_users)
    #expand(foot_users)
  #end
#end
```



A rectangular box contains the following template-like code:
#defmacro(elem_users)
 #foreach(user in userlist)
 #expand(head_users)
 #expand(body_users)
 #expand(foot_users)
 #end
#end
A wavy arrow originates from the right side of the box and points to the right, labeled with the letter 'La'.

[FIG. 8]

```
#defmacro(elem_users)
  #foreach(user in userlist)
    #expand(body_users)
  #end
#end
```



A rectangular box contains the following template-like code:
#defmacro(elem_users)
 #foreach(user in userlist)
 #expand(body_users)
 #end
#end
A wavy arrow originates from the right side of the box and points to the right, labeled with the letter 'Lb'.

[FIG. 9]

```
#defmacro(elem_users)
#set(i = 0)
#foreach(user in userlist)
    #set(i = i+1)
    #if(i%2 ==0)
        #set(color = " red ")
    #else
        #set(color = " blue ")
    #end
    #expand(head_users)
    #expand(body_users)
    #expand(foot_users)
#end
#end
```

Lc

[FIG. 10]

```
class Example {  
    variable user;  
  
    method generate() {  
        doc = new Document();  
        addElementFoo(doc);  
        return doc.transformToXmlString();  
    }  
  
    method addElementUsers(Element parent) {  
        elem = new Element("ul");  
        addContentUsers(elem);  
        parent.appendChild(elem);  
        return elem;  
    }  
  
    method addContentUsers(Element parent) {  
        elem = new Element("li");  
        text = new Text(user);  
        elem.appendChild(text);  
        parent.appendChild(elem);  
        return elem;  
    }  
}
```

[FIG. 11]

```
class MyExample extends Example {  
    variable userlist;  
  
    method addContentUsers(Element parent) {  
        foreach (user in userlist) {  
            super.addContentUsers(parent);  
        }  
    }  
}
```

[FIG. 12]

```
class MyExample extends Example {  
    variable user;  
    variable userlist;  
  
    method addElementUsers(Element parent) {  
        foreach (user in userlist) {  
            super.addElementUsers(parent);  
        }  
    }  
}
```

[FIG. 13]

```
class MyExample extends Example {  
    variable userlist;  
  
    method addElementUsers(Element parent) {  
        super.addElementUsers(parent);  
    }  
}
```

[FIG. 14]

```
class MyExample extends Example {  
    variable userlist;  
  
    method addElementUsers(Element parent) {  
        i = 0;  
        foreach (user in userlist) {  
            i = i+1;  
            if (i % 2 == 0)  
                color = " red ";  
            else  
                color = " blue ";  
            super.addElementUsers(parent);  
        }  
    }  
}
```

[FIG. 15]

```
<ul>
#foreach(user in list)
  <li>${user}</li>
#end
</ul>
```

Conventional template
(Presentation data + Presentation logic)